REMARKS/ARGUMENTS

Reconsideration is respectfully requested of the Final Official Action of November 15, 2005, relating to the above-identified application.

A request for a three-month extension of time, together with the associated fee (less the amount already paid for the one month extension of time filed Feb. 16, 2006), is attached.

Applicants wish to confirm and acknowledge a telephone discussion with Examiner Leung on April 18, 2006, during which counsel said that an amendment would be filed to replace the word "abutting" with words to express the fact that lateral surfaces (2) of wall elements (1) are separated by spacer element 13 as shown in Figure 4, thereby creating the reaction space 3. See also, page 14, lines 8-13. On page 15, beginning at line 6, it is explained that the width of reaction space (3) is maintained by spacer (13). Therefore, Claim 17 has now been amended to replace the word "abutting" with the words "spaced apart" which more correctly defines the reactor configuration described herein. No new matter is presented.

Turning now to the Final Official Action, applicants traverse the rejection of Claims 17, 19 and 20 as allegedly anticipated under 35 U.S.C. § 102(b) in view of *Schubert, et al.*, US 5,803,600, (*Schubert*) and respectfully request reconsideration.

The Official Action relies on the disclosure of *Schubert*, at col. 3, lines 48-59, as allegedly disclosing an apparatus comprising a reactor in which there is located a plurality of wall elements, a plurality of slot-shaped reaction spaces, a plurality of cavities for conducting a fluid heat exchange medium, and where the reaction spaces are formed between the lateral surfaces of two abutting wall elements. The *Schubert* reference is also quoted to show wall elements made of solid plates arranged interchangeably in a block as a virtual right

parallelepiped wherein the slot-shaped reaction spaces are able to have reactants A and B supplied from the same side of the block and wherein the reaction spaces are oriented to guide the reaction mixture C through the reaction spaces in the same direction and in parallel flows.

However, applicants submit that the description in col. 3 of *Schubert* fails to show a reaction space formed between the surfaces of two spaced apart wall elements as now defined in the claims.

Schubert only discloses devices made by stacking foils and joining them so that they are in direct contact (see col. 3, lines 9 to 13). There is no disclosure of a device with a reaction space formed between the surfaces of two spaced apart wall elements; i.e. where the wall surfaces are kept apart at a distance of, for example, 0.05 to 5mm by spacer means.

Therefore, *Schubert* does not anticipate the claimed subject matter within the meaning of 35 U.S.C. § 102(b).

The rejection of Claims 26-32 under 35 U.S.C. § 103(a) as unpatentable over *Schubert* taken with *Stancliffe et al.,* US 1,622,870, (*Stancliffe*) is traversed and reconsideration is requested.

Combining *Schubert* with *Stancliffe* does not provide a skilled person with any motivation to arrange plates in a spaced apart relationship, as *Stancliffe* is related only to device where plates are stacked in direct contact to each other.

Schubert does not disclose devices, where wall elements of a block are arranged in a spaced apart relationship to create the reaction space there between. Thus, the rejection which relies on *Schubert* as the principal teaching of the features of the invention is flawed because it does not show the slot shaped reaction spaces between lateral spaced apart interchangeable wall

elements. Neither does *Stancliffe* provide any suggestion that there is an advantage or benefit to be obtained therefrom.

Therefore, the necessary motivation to combine references is missing from the combination of references relied on in the Office Action. Accordingly, withdrawal of the rejection is respectfully requested.

The rejection of Claims 33, 35 and 36 under 35 U.S.C. § 103(a) as unpatenable over *Schubert* is traversed and reconsideration is respectfully requested.

Claims 33, 35 and 36 all depend directly or indirectly in Claim 17 and include all the features of that claim. All arguments previously made apply here as well and will not be repeated to avoid redundancy. Withdrawal of the rejection is respectfully requested.

The rejection of Claims 17-20, 23-32 and 36 under 35 U.S.C. § 103(a) in view of *Ashmead, et al.,* U.S. 5, 690,763, (*Ashmead*) is traversed and reconsideration is respectfully requested.

The Office Action summarizes the *Ashmead* reference and then admits that the reference is silent as to the right parallelepiped wall elements and tubular shaped heat exchanger cavities. Nevertheless, the Office Action concludes that it would have been obvious to a person having ordinary skill in the art to "select such geometries for the wall elements and heat exchanger cavities in the apparatus of *Ashmead,* on the basis of stability of the intended use, because changes in shape would merely involve ordinary skill in the art".

In response, applicants point out that Claim 17 has now been amended to recite the feature of the spaced apart relationship of the wall element which in turn creates the reactive space there between. Thus, the slot-shaped reaction space formed between lateral surfaces of

two spaced apart and substantially right parallelepipedal wall elements will necessarily be planar with a substantially constant width and extend across essentially the whole area of the wall element surface because the lateral surface of the right parallelepipedal element is by definition substantially flat.

In the device shown by *Ashmead*, the laminae 1000 to 1100 are in direct contact with each other thereby leaving no space between the lateral surfaces of the laminae except for the portions of the surfaces that have been deepened by grooves or other recesses. This direct contact between laminae is necessary for the device to be operable by conducting reactants and products to and from laminae through ports 20, 24 and 34 of the device. The reactor channels 90-1' to 90-8' cited by the Examiner are fundamentally different from the slot-shaped reaction spaces of the application in that the lateral surfaces of laminae 1000 and 1100 shown in Fig. 16 of the reference are in direct contact with each other. This leaves no space in between except for the recesses formed by the grooves in the surface of laminae 1000 and 1100. Consequently, the reactor channels 90-1' to 90-8' are confined to the areas of such recesses whereas the reaction space of the claimed invention extends across the full area of the lateral surfaces forming the reaction space.

The heat exchanger assembly as shown in Figs. 10, 13 and 14 of *Ashmead* cited in the Official Action do not comprise wall elements with tubular cavities for conducting a fluid exchange medium reaching through a wall element. In the assembly of Fig. 10, the heat exchanging fluid enters through the inlet port 75 and leaves through outlet port 76. This is described in col. 12, lines 3-5, of the reference. The fluid is not passed through any tubular cavity reaching through the wall elements 500 or 600. All the cavities reaching through the wall

elements are necessary for passing through reactants or reaction products and the device would not fulfill the intended purpose if heat-exchanging fluid would be passed through one of these cavities. The same holds for the cavities of the wall elements 800, 900 and 1000, which form the heat exchanger assemblies of Figs. 13 and 14.

It is noted that the Official Action that a person of ordinary skill in the art would consider the geometry of the reaction spaces formed in the claimed apparatus as being suitable for the intended use of the apparatus of *Ashmead.* Applicants respectfully submit that this allegation is in clear contradiction to the teachings of the reference. Indeed, *Ashmead* explicitly teaches that the apparatus requires a tortuous channel for passing the reactants through to fulfill its purpose. It is noted that the Examiner has cited that teaching in the Official Action.

However, a skilled person would not consider the flat reaction spaces of uniform distance formed between wall elements of the claimed apparatus to be tortuous channels and, therefore, would not consider to use such a geometry for reaction spaces based on the teaching of *Ashmead.*

With respect to *Ashmead,* this reference only discloses devices where the laminae are stacked in direct contact with each other, see Figs. 1, 4 and 5. This also holds true for laminae 1000 and 1100 shown in Fig. 16, referred to in the Office Action. *Ashmead* does not disclose slot-shaped reaction spaces formed between lateral surfaces of two spaced apart wall elements which have a slot width of, for example, from 0.005 to 5 mm formed between the wall elements.

The claims of this application clearly specify that the slot-shaped reaction spaces are arranged for passing reactants and reaction mixture through the said reaction spaces. Also, the tubular cavities are arranged for conducting a heat-exchange medium therethrough, i.e., the reaction space and the tubular cavities are intended for different media. There is nothing in the

claims or the specification of the application to indicate that the reaction mixture can be used as heat-exchange medium and therefore, a skilled person has no reason to interpret the claims in the sense that the reaction mixture and the heat-exchange medium shall be the same medium. The Office Action contains no reason why the use of reaction mixture as a heat-exchange medium shall be the intended purpose of the claimed apparatus. The citation of parts of the description of *Ashmead* out of context cannot be a substitute for such reasoning.

The only part of the *Ashmead* device that corresponds to the cavities for conducting a heat-exchange medium therethrough is the combination of laminae 500 and 600. This part of the device is separated from the laminae 1000 and 1100, forming the reaction channels cited by the Examiner, by a thermal insulation barrier formed between laminae 700 and 800 as described in col. 12, lines 18 to 32 of *Ashmead.* Therefore, the device of *Ashmead* does not comprise wall elements forming a reaction space in between two spaced apart wall elements and at the same time providing cavities within these wall elements for passing a heat-exchange fluid therethrough. These distinction cannot be ignored. Similarly, features of the prior art cannot be cited in isolation without considering the relationship between them as described in the prior art.

The claimed apparatus differs from the *Ashmead* apparatus not merely by routine geometries that can be modified or changed at will. The disclosure of *Ashmead* that the size and shape of reaction channels and the number and geometry of the laminae can be changed, provides no guidance as to why these geometries should be changed and how to vary these features, i.e. to increase or decrease. *Ashmead* fails to lead a skilled person to a device, where the spaced apart wall elements forming the reaction space comprise cavities. Nothing of the sort

is shown or suggested by *Ashmead.* Accordingly, withdrawal of the rejection is respectfully requested.

The rejection of Claims 17, 19, 21, 23 and 33 as unpatentable under 35 U.S.C. § 103(a) in view of *Vu, et al.,* US 4,820,495 (*Vu*) taken with *Alagy, et al.,* US 4,973,977 (*Alagy*) is traversed and reconsideration is respectfully requested.

Vu is summarized in the Official Action as showing a reactor in which there are located a plurality of wall elements, a plurality of slot-shaped reaction spaces and a plurality of cavities for conducting therethrough a heat exchange medium. The slot-shaped reaction spaces are said to be able to have the reactants supplied from the same side of the block and being oriented to guide the reaction mixture through the reaction spaces in the same direction and in parallel flows.

Alagy is relied on in the Office Action to show slot width of various dimension.

With respect to *Vu*, it is correct that *Vu* does not disclose the width of the reaction space between the plates 9. The Office Action then alleges that it would have been obvious for a skilled person to select a width within the claimed range based on the suitability for the intended use. However, the Office Action provides no reasons as to why a person skilled in the art would construct a reactor with spaced apart walls as defined in the claims herein. The reference contains no disclosure as far as the distance is concerned between the heat exchange plates 9 or 31 and provides no guidance to a person skilled in the art on how to selected such distances. The reference also does not give any indication that the distance between the plates 9 or 31 may have any effect on the spreading of flames in the slot formed between the two plates.

However, the apparatus of *Vu* is intended to be used for reactions under high pressure with a heterogeneous catalyst, which is packed within the reaction spaces. The reactor is also

intended for use at high gas velocities of 1 to 200 meters per second, see col. 4, lines 31 to 33. It is common knowledge in the fields of chemical engineering that packings of small catalyst particles will lead to an increased pressure drop in the catalyst bed, in particular at high gas flow rates. This leads to an increased energy consumption and therefore, a skilled person will avoid catalyst particles that are smaller than necessary. It is also common knowledge that it is difficult to fill slot-shaped spaces with a width of 5mm or less with catalyst particles of the common size used in the reactions of *Vu*. Therefore a person skilled in the art would have had no motivation to select a reaction space width within the claimed range for the intended purpose disclosed in *Vu* in the absence of any further guidance.

The only indication of the width of reaction spaces between the heat-exchange plates in *Vu* is given in Fig. 4 and 4a, which show the reaction space width between the heat-exchange plates to be substantially larger than the thickness of the heat-exchange plates themselves. This also would not motivate a skilled person to select a slot width of 5 mm or less, based on the usual thickness of metal sheets used for constructing heat exchangers of the size intended in *Vu* i.e., up to 10 meters in length, see col. 2, lines 59 to 66.

With respect to the combination of *Vu* and *Alagy* it is to be noted that *Alagy* is directed to reactions carried out at ambient pressure and high temperatures in empty reaction channels in the absence of any catalyst. Therefore, *Alagy* cannot give a skilled person any guidance on how to select the width of a reaction space filled with a heterogeneous catalyst in the apparatus of *Vu*.

As a general observation, many arguments contained in the Final Action are made in hindsight, based on the teachings of the application, without providing reasons for why a skilled person would combine particular features or documents based on what is taught in the prior art or

what are the uses intended in the prior art. Picking and choosing features from the prior art in isolation without considering obvious functional relationships between the features and the teachings of the reference as a whole is not the proper test of obviousness.

Applicants have made an earnest effort to advance the prosecution of this application by more clearly pointing out the important structural features of the invention that distinguish from the prior art. Applicants submit that the references, either individually or in any combination, neither anticipate nor render obvious the claimed subject matter herein.

In view of the foregoing, applicants respectfully request reconsideration and favorable action at the Examiner's earliest convenience.

Respectfully submitted,

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